

F-band, High-Efficiency GaN Power Amplifier for the Scanning Microwave Limb Sounder and SOFIA, Phase I

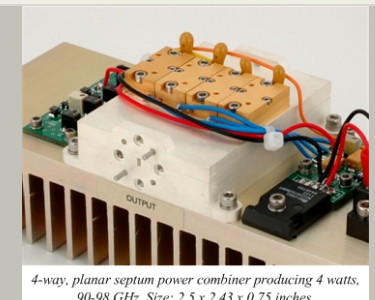
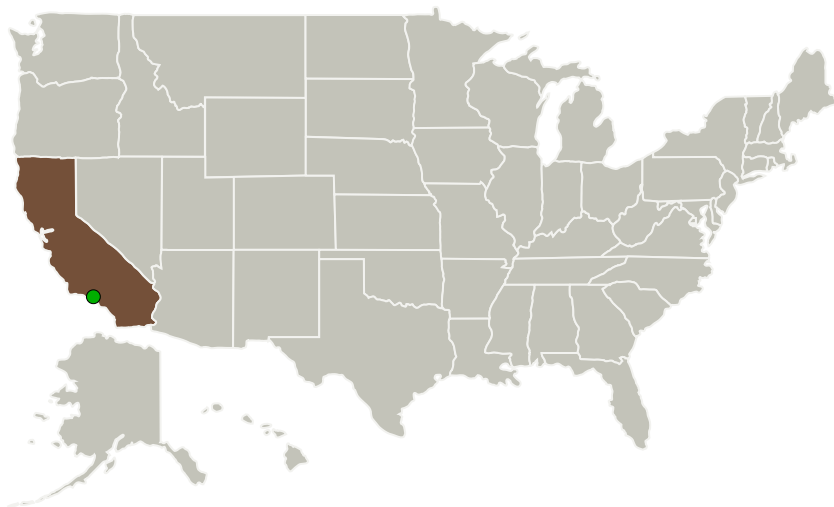
Completed Technology Project (2013 - 2013)



Project Introduction

QuinStar Technology proposes to develop a 4-watt Solid-State Power Amplifier (SSPA) operating at F-band (106-114 GHz) with a power-added efficiency (PAE) of greater than 30%. This will be achieved by employing two major innovations. First, we are employing state-of-the-art wide bandgap GaN (Gallium Nitride) devices. High power density GaN devices have recently been demonstrated at millimeter-wave frequencies with power densities of 5 to 8 times higher than GaAs and drain efficiencies of 50%. Using these devices in a quasi-switching mode, we are proposing to develop a new high-efficiency MMIC operating at F-band with an output power of one watt and an efficiency of greater than 33%. Secondly, we are proposing to utilize a new low loss, H-tee combining approach to combine 4 of these high-efficiency chips to achieve 4 watts. The net result is a unique combination of high performance devices and innovative power combining. We anticipate that this work will result in an order of magnitude increase in the state-of-the-art of SSPA output power and efficiency at F-band. As a result, we believe this work could be very important for NASA's Astrophysics and Earth Science missions and for W-band radar and communications applications.

Primary U.S. Work Locations and Key Partners



4-way, planar septum power combiner producing 4 watts, 90-98 GHz. Size: 2.5 x 2.43 x 0.75 inches.

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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
Quinstar Technology, Inc	Lead Organization	Industry Small Disadvantaged Business (SDB)	Torrance, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

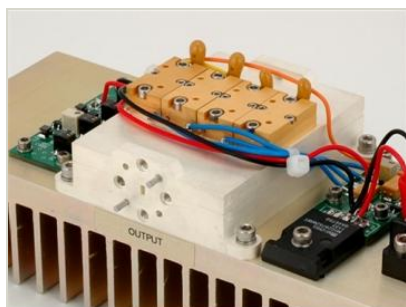
Project Transitions

**May 2013:** Project Start**November 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140433>)

Images



4-way, planar septum power combiner producing 4 watts, 90-98 GHz. Size: 2.5 x 2.43 x 0.75 inches.

Project Image

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(<https://techport.nasa.gov/image/133000>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Quinstar Technology, Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

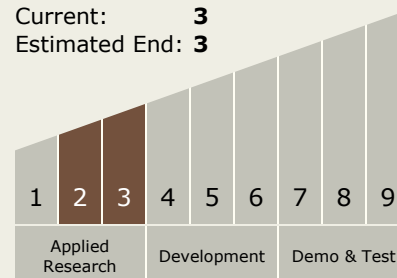
Carlos Torrez

Principal Investigator:

James Schellenberg

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System